CLAIMS

1. A logarithmic calculating apparatus for determining the approximate value of a logarithmic function F(x) at a value of x of interest, the apparatus comprising:

at least one first memory device that can store values of the function F(x) for a plurality of discrete values of x;

at least one first multiplier device that can multiply the value of G(x) for a said discrete value of x adjacent to the value of x of interest by δ, the difference between said adjacent discrete value of x and the value of x of interest, wherein G(x) is a linear function of x in an interval between adjacent said discrete values of x;

at least one second memory device that can store values of E(x), the approximate difference between $[F(x) + \Delta.G(x)]$ and $F(x+\Delta)$ where x and $x+\Delta$ are the adjacent pair of said discrete values of x nearest to the value of x of interest;

at least one third memory device that can store values of $P(\delta)$, the ratio of (i) the difference between $F(x+\delta)$ and $[F(x) + \delta.G(x)]$, to (ii) E(x) for a plurality of values of δ;

at least one second multiplier device that can multiply together the outputs of at least one said second and at least one said third memory device to determine a value of E(x). $P(\delta)$for the value of δ interest; and

at least one adder device that can add together the outputs of at least one said first memory device, at least one said first multiplier device and at least one said second multiplier device to determine a value of $[F(x) + \delta.G(x) + E(x). P(\delta)]$, representing the approximate value of F(x) at the value of x of interest.

2. An apparatus according to claim 1, further comprising at least one fourth memory device that can store values of G(x) for said discrete values of x.

3. An apparatus according to claim 1, wherein G(x) is F'(x), the slope of the function F(x) for said plurality of discrete values of x.

4. An apparatus according to claim 1, wherein G(x) represents a line substantially parallel to a tangent to the curve F(x) at least one value of x between a pair of adjacent said discrete values of x.

5. An apparatus according to claim 1, wherein G(x) represents a chord joining points on the curve F(x) at the pair of discrete values of x adjacent the value of x of interest.

6. An apparatus according to claim 1, wherein G(x) is F'(x), the slope of the function F(x) for at least one value of x between a pair of adjacent said discrete values of x.

7. An apparatus according to claim 1, wherein G(x) represents a line substantially parallel to a chord joining points on the curve F(x) at the pair of discrete values of x adjacent the value of x of interest.

8. An apparatus according to claim 1, wherein at least one said first and at least one second multiplier device operate substantially simultaneously in use.

9. An apparatus according to claim 1, further comprising at least one further adder device.

10. An apparatus according to claim 1, wherein at least one said adder device is a carry-save-add device cooperating with at least one carry-propagate add device.

11. An apparatus according to claim 1, wherein at least one said first, second and third memory device are accessed substantially simultaneously in use.

12. A microprocessor including a logarithmic calculating apparatus comprising:

at least one first memory device that can store values of the function F(x) for a plurality of discrete values of x;

at least one first multiplier device that can multiply the value of G(x) for a said discrete value of x adjacent to the value of x of interest by δ, the difference between said adjacent discrete value of x and the value of x of interest, wherein G(x) is a linear function of x in an interval between adjacent said discrete values of x;

at least one second memory device that can store values of E(x), the approximate difference between $[F(x) + \Delta.G(x)]$ and $F(x+\Delta)$ where x and $x+\Delta$ are the adjacent pair of said discrete values of x nearest to the value of x of interest;

at least one third memory device that can store values of $P(\delta)$, the ratio of (i) the difference between $F(x+\delta)$ and $[F(x) + \delta.G(x)]$, to (ii) E(x) for a plurality of values of δ;

at least one second multiplier device that can multiply together the outputs of at least one said second and at least one said third memory device to determine a value of $E(x). P(\delta)$for the value of δ interest; and

at least one adder device that can add together the outputs of at least one said first memory device, at least one said first multiplier device and at least one said second multiplier device to determine a value of $[F(x) + \delta.G(x) + E(x). P(\delta)]$, representing the approximate value of F(x) at the value of x of interest.

13. A microprocessor according to claim 12, further comprising at least one fourth memory device that can store values of G(x) for said discrete values of x.

14. A method of determining the approximate value of a logarithmic function F(x) at a value of x of interest in a logarithmic calculating apparatus, the method comprising the steps of:

storing values of the function F(x) for a plurality of discrete values of x;

multiplying the value of G(x) for a said discrete value of x adjacent to the value of x of interest by δ, the difference between said adjacent discrete value of x and the value of x of interest, wherein G(x) is a linear function of x in an interval between adjacent said discrete values of x;

storing values of E(x), the approximate difference between $[F(x) + \Delta.G(x)]$ and $F(x+\Delta)$ where x and $x+\Delta$ are the adjacent pair of said discrete values of x nearest to the value of x of interest;

storing values of $P(\delta)$, the ratio of (i) the difference between $[F(x) +\delta.G(x)]$ and $F(x+\delta)$, to (ii) E(x) for a plurality of values of δ;

multiplying together the values of E(x) and $P(\delta)$ for the value of x of interest; and

adding together said values of F(x), $\delta.G(x)$ and $E(x).P(\delta)$ to provide the approximate value of F(x) for the value of x of interest.

15. A method according to claim 14, further comprising storing values of G(x) for said discrete values of x.

16. A method according to claim 14, wherein G(x) is F'(x), the slope of the function F(x) for said plurality of discrete values of x.

17. A method according to claim 14, wherein G(x) represents a line substantially parallel to a tangent to the curve F(x) at at least one value of x between a pair of adjacent said discrete values of x.

18. A method according to claim 14, wherein G(x) represents a chord joining points on the curve F(x) at the pair of discrete values of x adjacent the value of x of interest.

19. A method according to claim 14, wherein G(x) is F'(x), the slope of the function F(x) for at least one value of x between a pair of adjacent said discrete values of x.

20. A method according to claim 14, wherein G(x) represents a line substantially parallel to a chord joining points on the curve F(x) at the pair of discrete values of x adjacent the value of x of interest.

21. A method according to claim 14, wherein said multiplication steps are carried out substantially simultaneously.

22. A method according to claim 14, wherein said addition step is carried out by means of a carry-save-add stage cooperating with a subsequent carry-propagate-add stage.

23. A method according to claim 14, wherein the stored values are accessed substantially simultaneously.

24. A device, said device selected from the group consisting of a general purpose microprocessor, a numerical microprocessor, a graphics processor, and a digital signal processor, wherein said device comprises the apparatus of claim 1.

25. A device, said device selected from the group consisting of a graphics accelerator board, a video game, a communication device, a computer controlled device, a radar device, a sonar device, and a general purpose numerical processing device, wherein said device comprises the apparatus of claim 1.